Piston

an I-DEAS Exercise in Solid Modeling

by

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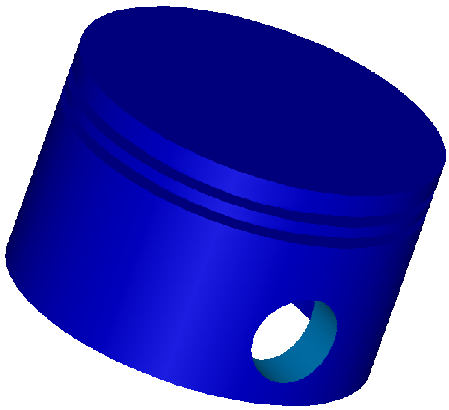


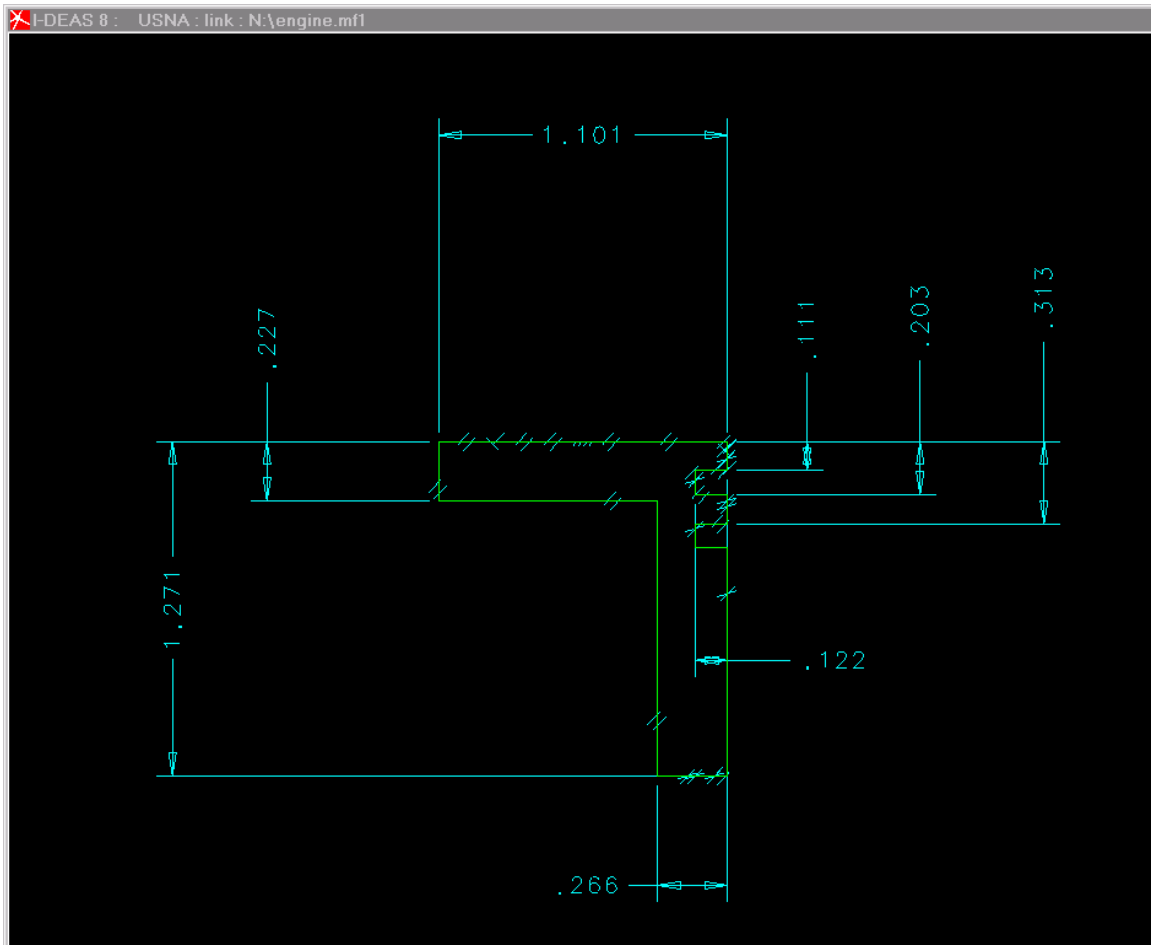
Build a Piston

In this exercise you will build a model of a piston for an engine. Here are some tips to remember when going through the exercise:

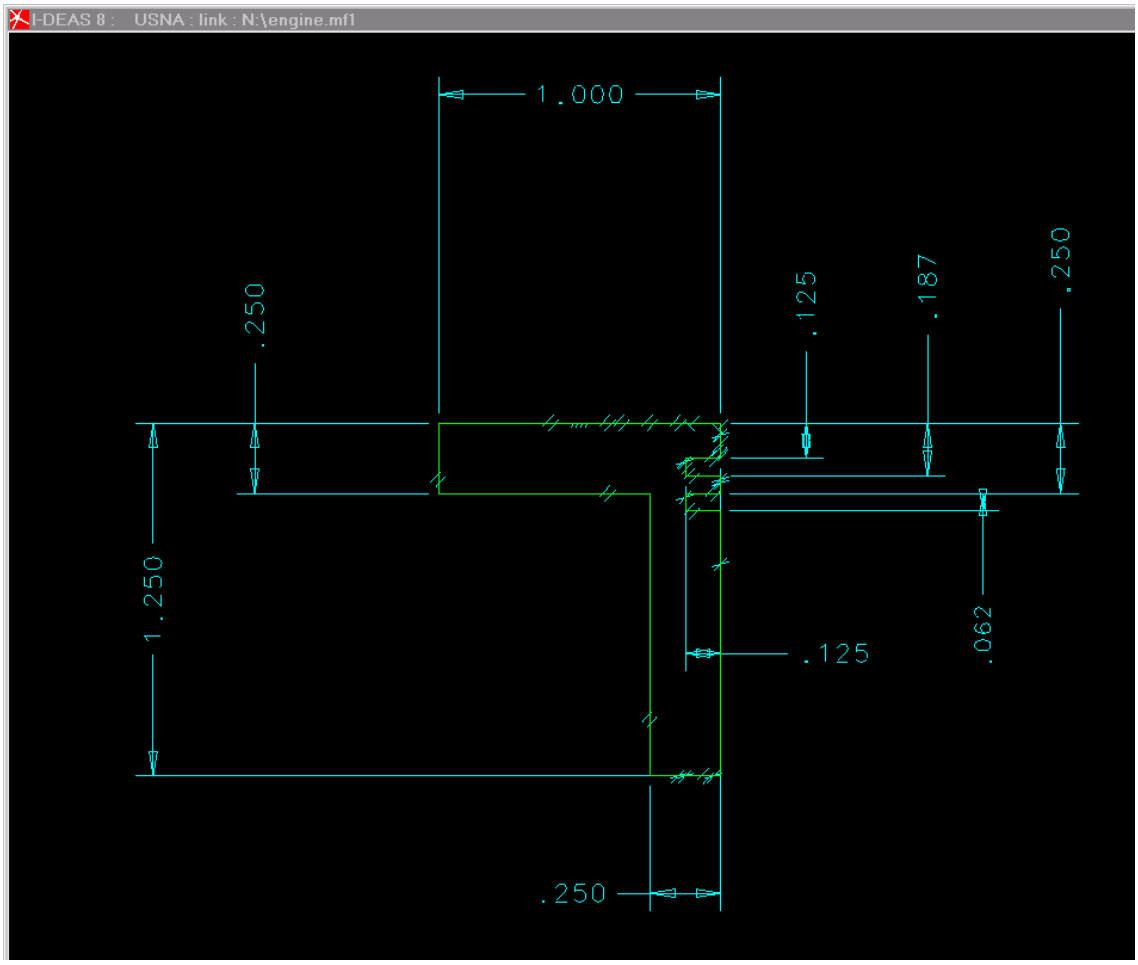
- Pay attention to the I-DEAS List and Prompt regions at the bottom of the large display window. The prompt region asks you for feedback or to select entities, the List region provides information.
- You can elect the default response from the prompt region by clicking the center mouse button. The button assignments are:
  - Left button - pick or select
  - Center button - Done or OK or accept default
  - Right button - display list of options for current command
- **Save your work after the completion of every successful step**. If you make a mistake on the next operation, you can recover to the model state from the last *Save* by typing *Ctrl-z*. There is no general Undo feature in I-DEAS!
- Use the Dynamic Viewing buttons (F1-Pan, F2-Zoom, and F3-3D Rotate) to adjust the display while you are in the middle of a command to help you select the entity you want. Hold the appropriate button down and drag the mouse in the display region.

Build a Piston

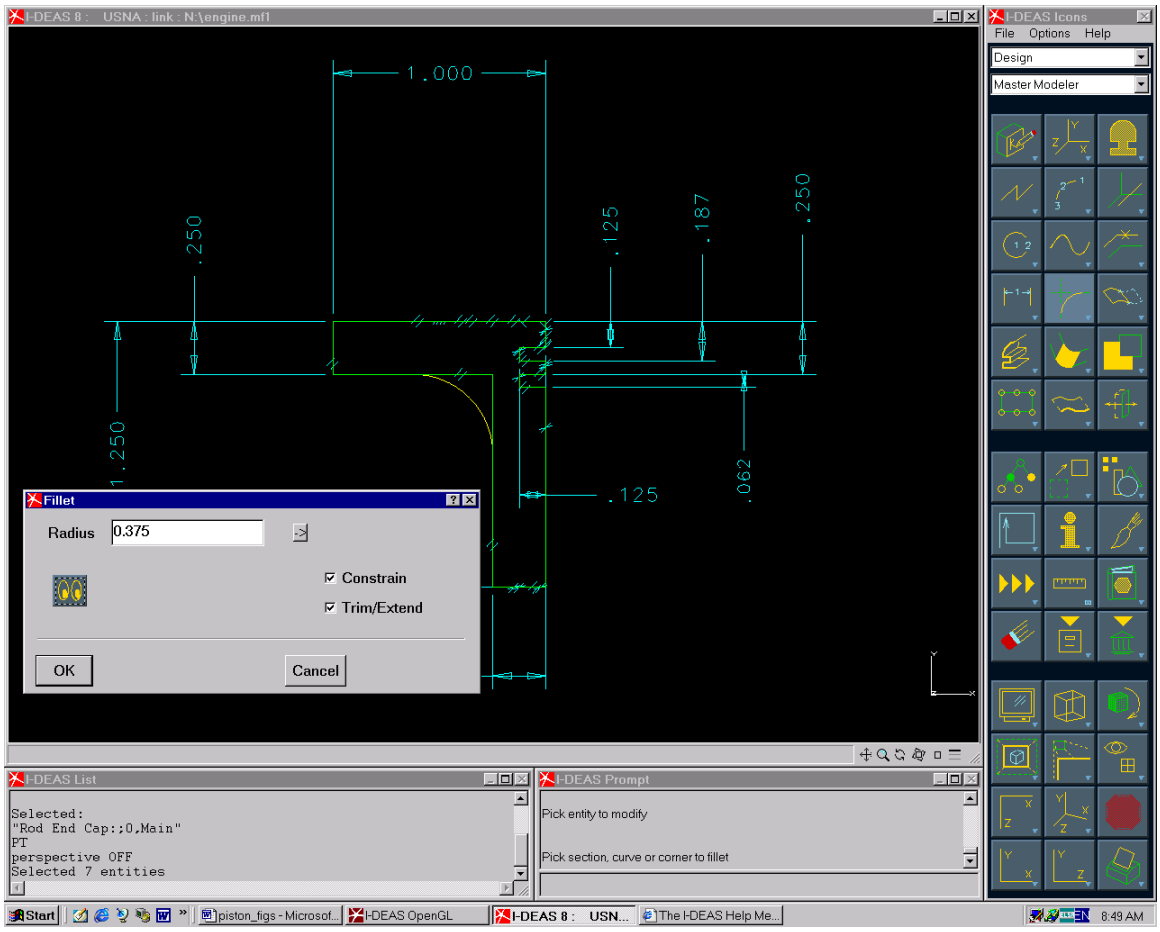
1. Open the model file containing your connecting rod. Put the connecting rod away in the bin if it isn't already there.
2. Using the polyline tool, sketch the outline shown below and add the dimensions as indicated.



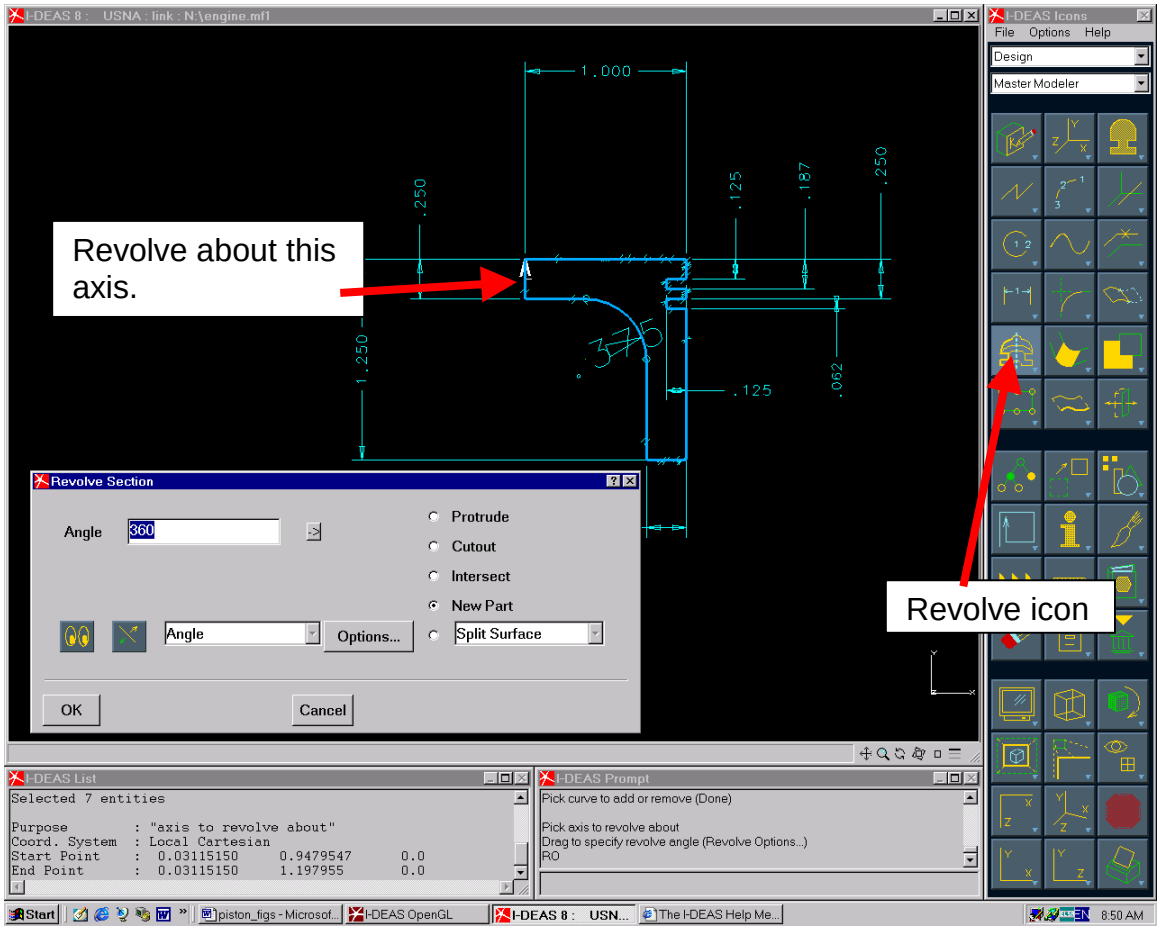
3. Modify the dimensions to match the ones shown below.

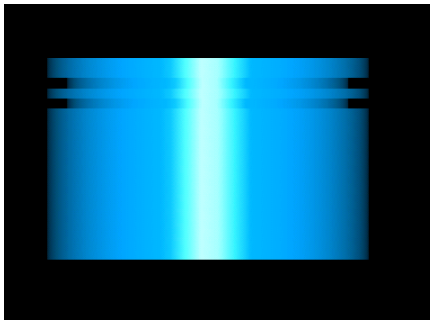


4. Add the fillet as shown and dimension the radius as 0.375 in.

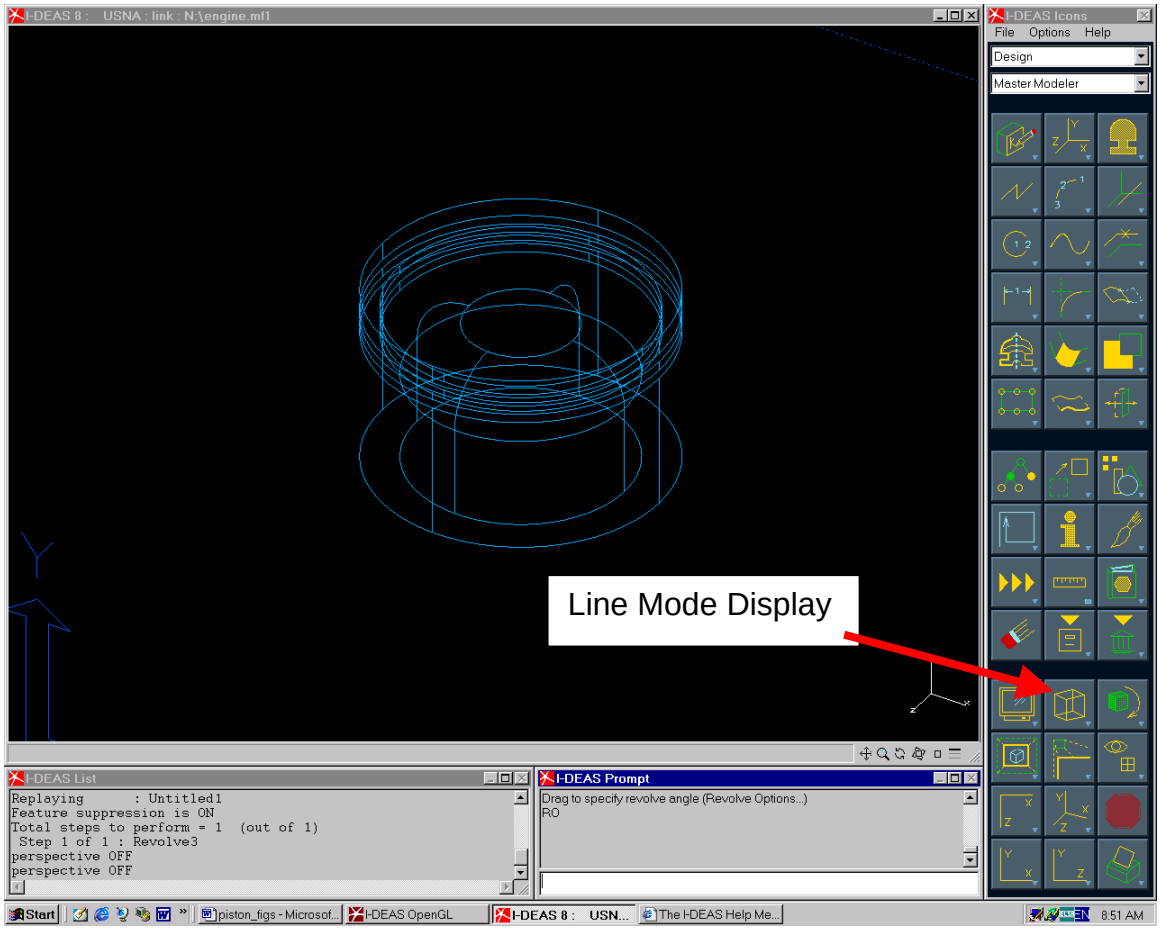


5. Revolve the section about the indicated line to form a solid model of a piston.

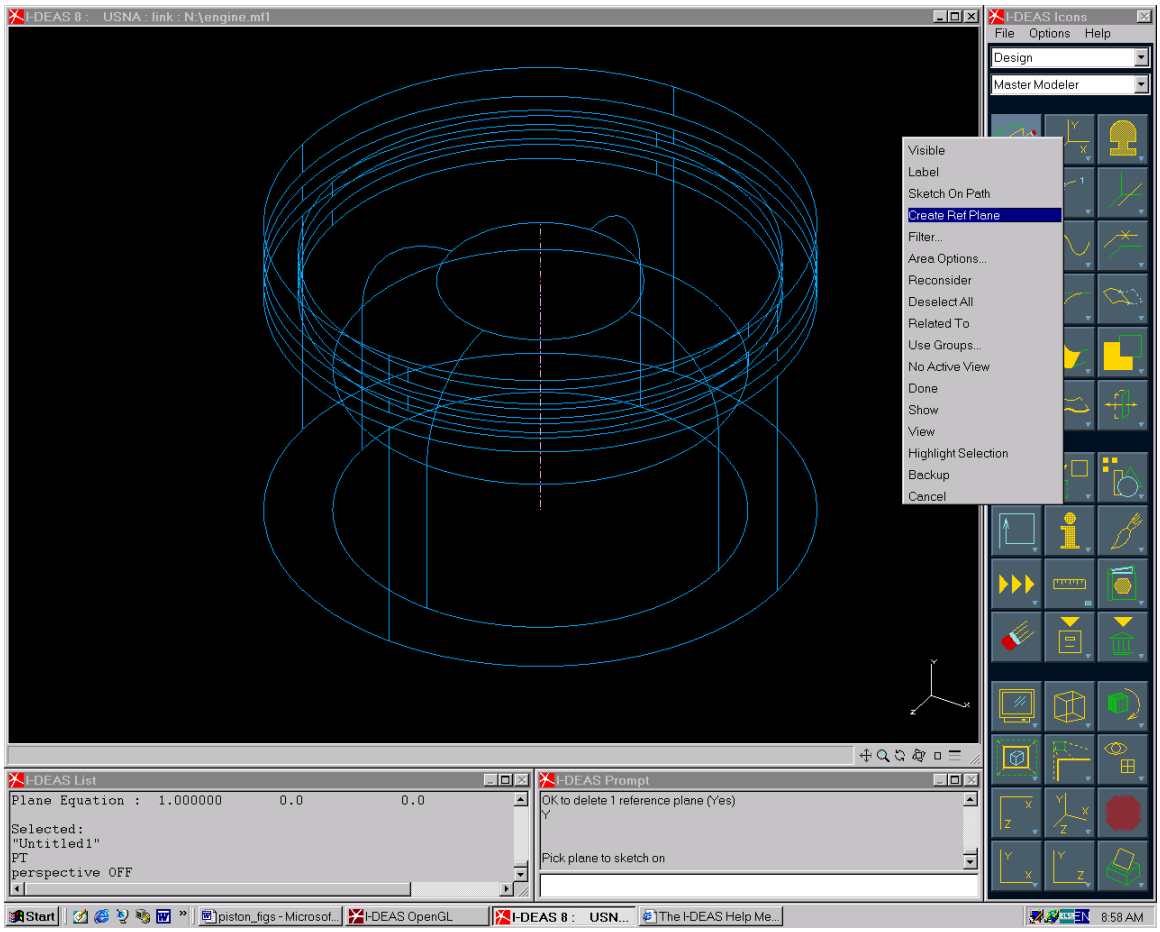




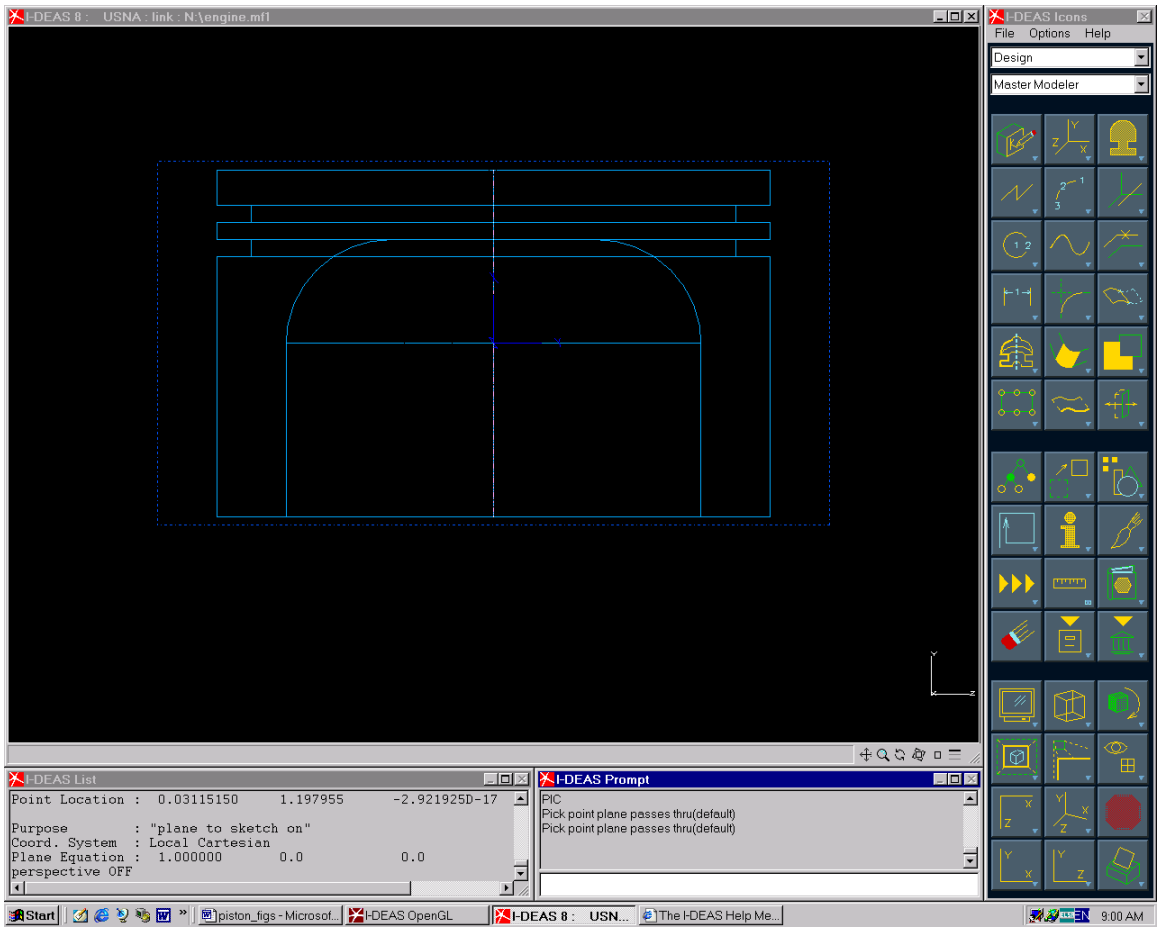
6. Switch to an isometric view and display using the *Line mode.*



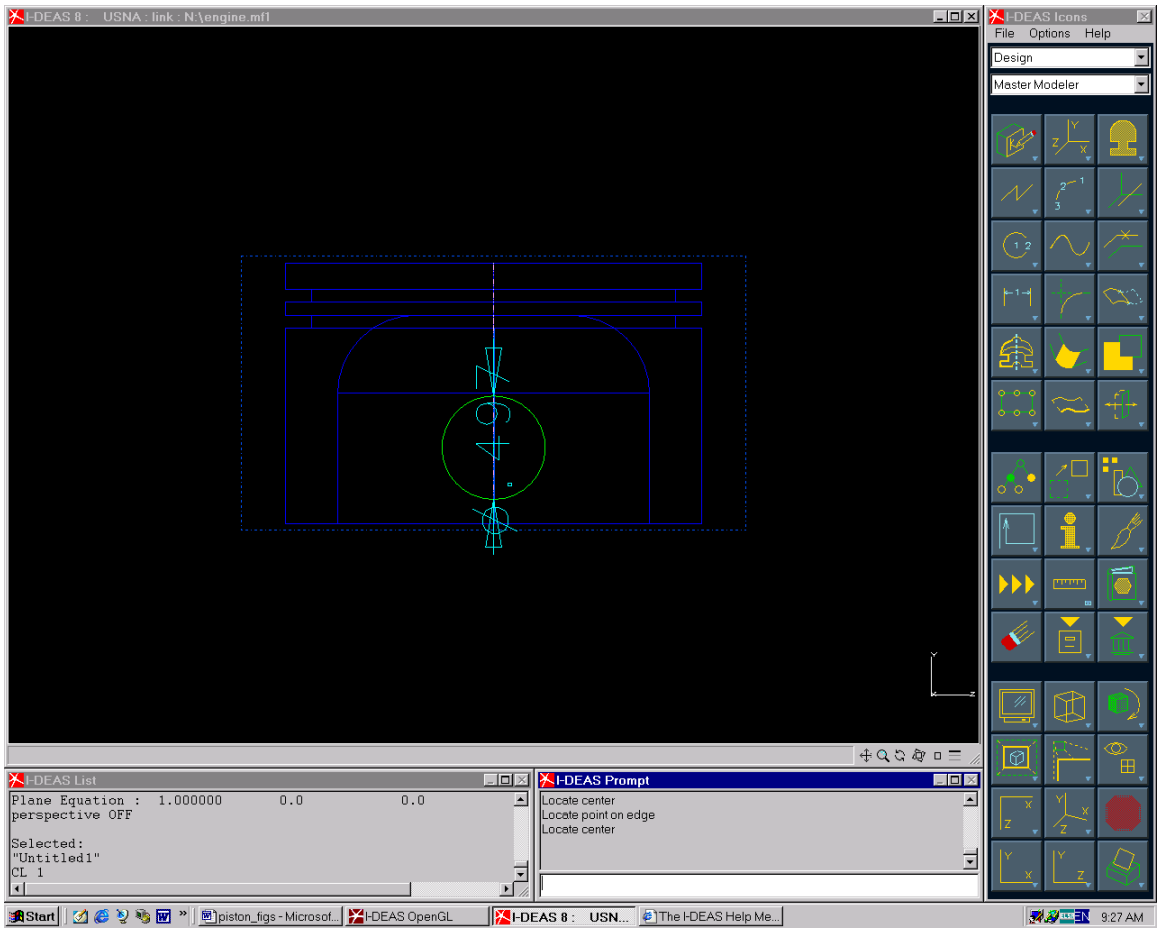
7. Select **Sketch in Place** and using the RMB and **Create Ref Plane**. RMB again to select **Axis Planes** and **YZ Plane**. **Pick Point** and select either end of the piston centerline to locate the reference plane.



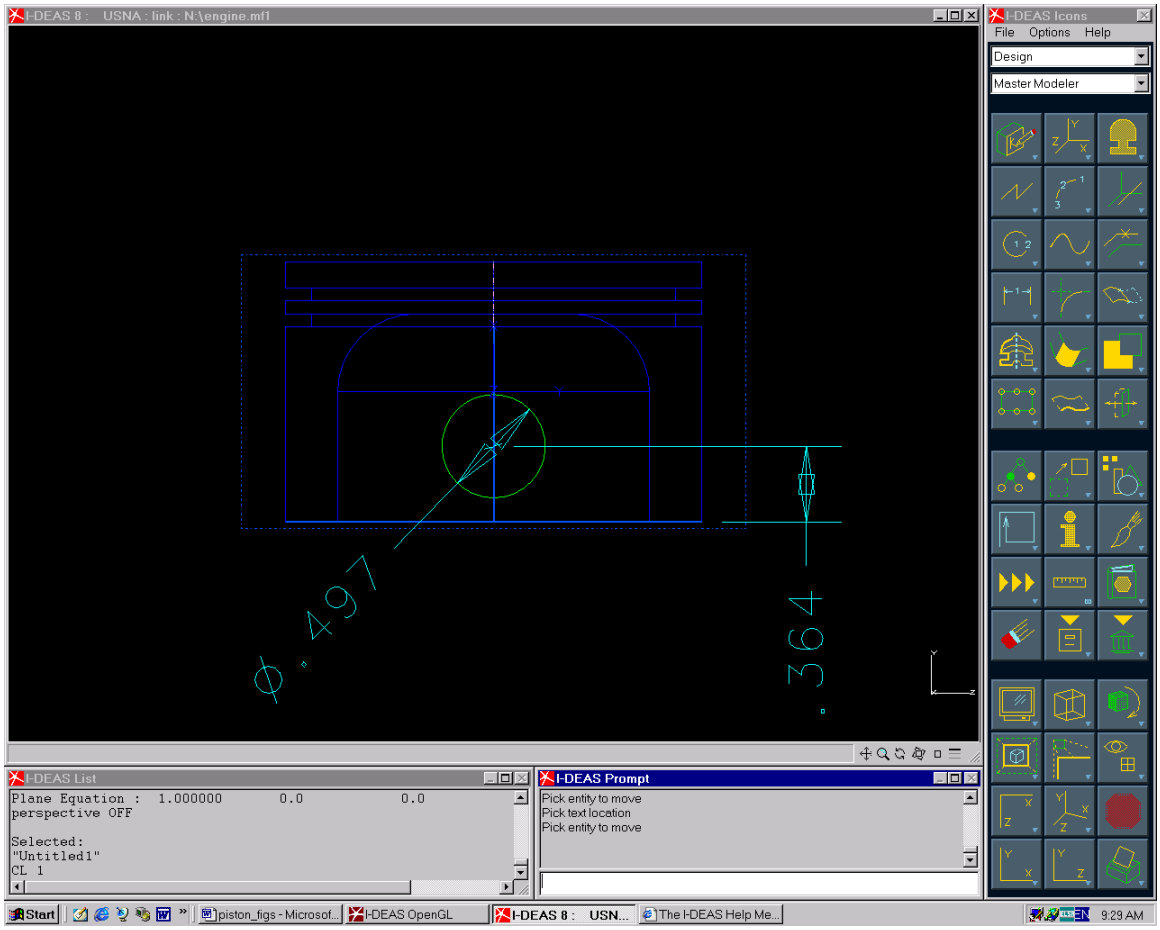
8. Switch to **YZ View.**



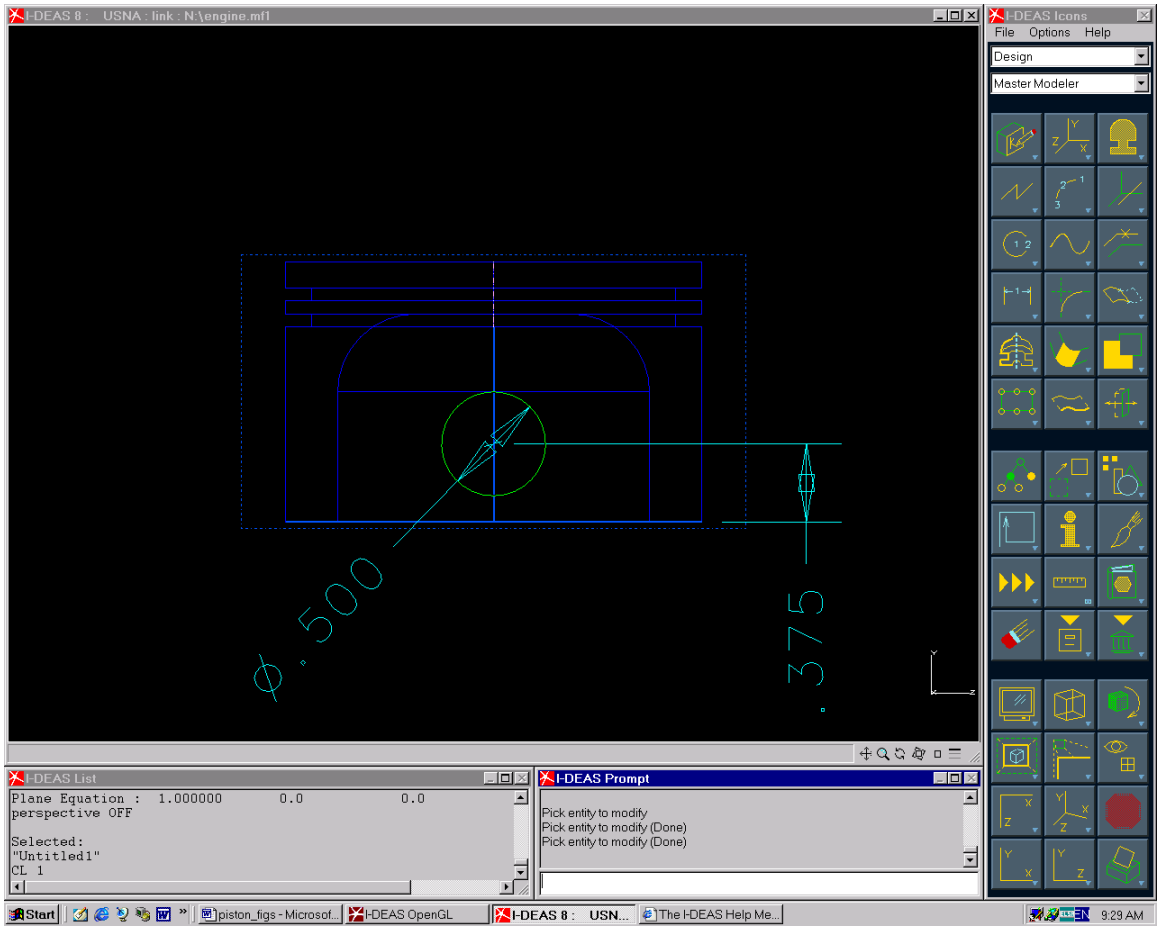
9. Sketch a circle about 0.5 in. dia., centered on the piston centerline as shown. You may need to **Focus** (use RMB to select options) on the centerline before it lets you locate the center of the circle on that line.



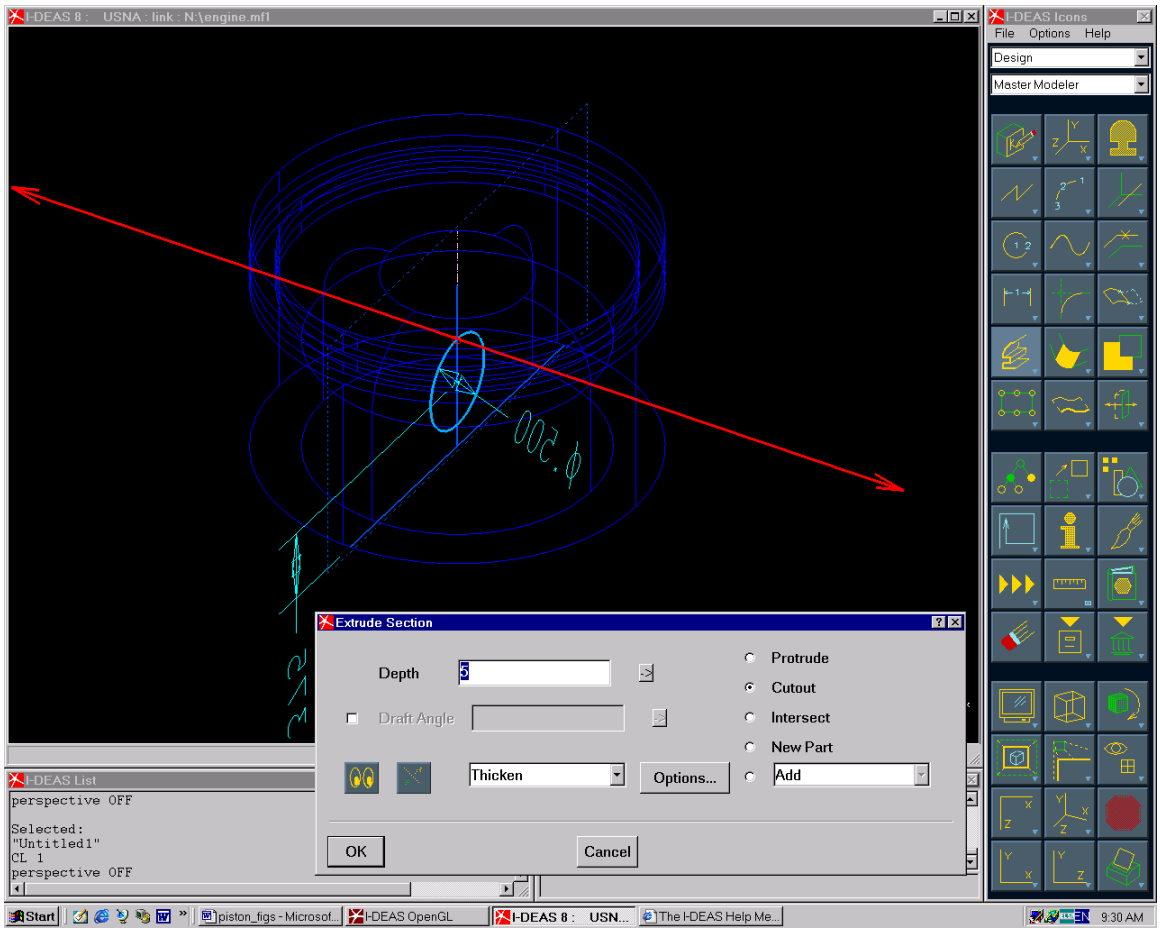
10. Add the vertical dimension from the circle center to the bottom edge of the piston. You will need to **Focus** on the bottom edge of the piston in order to add this dimension.



11. Modify the dimensions so that the circle center is 0.375 in. from the bottom edge of the piston and its diameter is 0.5 in.



12. Switch to **Isometric View** and select the **Extrude** icon. Select the circle as the section to extrude and check the **Cutout** option. Change the **Depth** to **Thicken** and set the depth to a large number, say 5 in. so that it cuts through everything.



13. Switch to the **Hardware Shading** to display your piston. Put the piston away in your bin and name the part **Piston** when you put it away.